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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/507,273

09/03/2004

Avto Tavkheldze

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4003

7590

06/16/2006

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EXAMINER

HINES, ANNE M

ART UNIT

PAPER NUMBER

2879

DATE MAILED: 06/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/507,273

Applicant(s)

TAVKHELIDZE ET AL.

Examiner

Anne M. Hines

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 March 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 24 is/are rejected.
- 7) ☒ Claim(s) 14-23, 25 and 26 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

The amendment filed on March 29, 2006, has been entered and acknowledged by the Examiner. Applicant's arguments regarding the 35 U.S.C. §102(e) rejection of claims 1-26 over Tavkhelidze et al. (US 6869855) are persuasive; this rejection has been withdrawn.

Claims 1-26 are pending in the instant application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2, 4-5, and 8-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fitzpatrick et al. ("Close-Spaced Thermionic Converters with Active Spacing Control and Heat-Pipe Isothermal Emitters") (of record) in view of DiMatteo et al. (US 6232546) and Nishioka et al. (US Pat. No. 4,880,975) (of record).

Regarding claims 1 and 2, Fitzpatrick teaches a diode device comprising: a first electrode attached to one end of three piezoelectric translators and a second electrode attached to the opposing end of the three piezoelectric translators and wherein the piezoelectric translators lengths are attached to controlling circuitry and modified by a signal so that the magnitude of a distance separating said electrodes is adjusted (page

926, Fig. 7; page 924). Fitzpatrick also teaches wherein three piezoelectric translators are provided in order to maintain parallel electrode surfaces (page 924). Fitzpatrick fails to teach wherein the piezoelectric translators are a housing means and a further pair of electrodes are attached to the inner and outer faces of the housing means.

In the same field of endeavor of electrode gap control with piezoelectric actuators, DiMatteo teaches a diode device with the gap between the first and second electrodes to control the distance separating the electrodes and wherein the piezoelectric actuators are a housing means (Fig. 6, 34; Column 6, lines 14-24; Column 6, lines 33-37) in order to maintain the enhanced performance of a sub-micron gap by compensating for thermal effects on the first and second electrodes (Column 1, lines 19-33). While DiMatteo teaches that the piezoelectric actuators are attached to control circuitry, it is silent with regards to the physical location of the electrodes that attach to the actuators to the control circuitry.

In the same field of endeavor of electrode gap control with piezoelectric actuators, Nishioka teaches a piezoelectric actuator housing that is adjustable in three dimensions, like the actuator configuration of both Fitzpatrick and DiMatteo, wherein a pair of electrodes are attached to the inner and outer faces of the housing (Fig. 2, 3 & 31-35; Column 2, line 60 to Column 3, line 8; Column 4, lines 33-35) in order to provide a fine adjustment mechanism that is not susceptible to variations in the voltage applied to the actuator (Column 1, lines 60-65).

Therefore, it would have been obvious to one of ordinary skill in the art to modify the invention of Fitzpatrick to have the piezoelectric actuators as a housing means, as

disclosed by DiMatteo, and have the cylindrical piezoelectric housing with a pair of electrodes for controlling the actuator attached to the inner and outer face of the housing, as disclosed by Nishioka, in order to compensate for thermal effects of the first and second electrodes and maintain the performance of a sub-micron gap and also to provide an fine adjustment actuator that is not susceptible to variations in the voltage applied to the actuator while maintaining the ability to adjust the gap in three dimensions.

Regarding claim 4, Nishioka further teaches wherein the piezoelectric actuator has a circular cross section (Fig. 1, 2; Column 2, lines 54-55). Motivation to combine is the same as for claim 1.

Regarding claim 5, Fitzpatrick further discloses wherein the first and second electrodes are a matched pair (page 924, both electrodes are flat).

Regarding claim 8, Fitzpatrick further discloses wherein the first electrode is in thermal contact with a heat source, and said second electrode is in thermal contact with a heat sink, and said electrical circuit connects said first and second electrodes to an electrical load (page 920).

Regarding claim 9, Fitzpatrick teaches wherein the first electrode is in thermal contact with a heat source, and said second electrode is in thermal contact with a heat sink, and said electrical circuit connects said first and second electrodes to an electrical load (page 920). Fitzpatrick fails to teach wherein the first and second electrodes are connected to a power supply. However, one of ordinary skill in the art would reasonably contemplate connecting the first and second electrodes to a power supply in order to

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use the invention of Fitzpatrick as a heat pump since it is the inverse function of the device as a power supply. Therefore, it would have been obvious to one of ordinary skill in the art to modify the invention of Fitzpatrick by connecting the first and second electrodes to a power supply in order to use the invention as a heat pump.

Regarding claims 10 and 11, Fitzpatrick further discloses wherein said diode device is both a thermionic converter and a gap diode (page 924).

Regarding claim 12, DiMatteo further teaches wherein the magnitude of a distance separating said electrodes is 0.1 microns (100nm) (Column 1, lines 23-25). Motivation to combine is the same as for claim 1.

Regarding claim 13, here the Applicant is claiming the product of matching electrodes including a method (i.e. a process) of making matching electrodes, consequently, claim 13 is considered "product-by-process" claim. In spite of the fact that the product-by-process claim may recite only process limitations, it is the product and not the recited process that is covered by the claim. Further, patentability of a claim to a product does not rest merely on the difference in the method by which the product is made. Rather, it is the product itself that must be new and not obvious (see MPEP 2113). Accordingly, the matching electrodes of Fitzpatrick, DiMatteo, and Nishioka are considered to meet the structural limitations claimed.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fitzpatrick et al. ("Close-Spaced Thermionic Converters with Active Spacing Control

and Heat-Pipe Isothermal Emitters”), DiMatteo et al. (US 6232546), and Nishioka et al. (US Pat. No. 4,880,975) in view of Johnston (US Pat. No. 3,600,933).

Regarding claim 3, Fitzpatrick, DiMatteo, and Nishioka teach the invention of claim 2 and wherein the piezoelectric actuator is a ceramic (Nishioka: Column 3, lines 3-5), but fail to teach wherein the piezoelectric actuator is quartz. Johnston teaches wherein a tubular piezoelectric actuator is quartz or a ceramic (Column 2, lines 69-72), thus exemplifying recognized equivalent materials for piezoelectric actuators. Accordingly, it would have been obvious to one of ordinary skill in the art to have the piezoelectric actuator of Fitzpatrick, DiMatteo, and Nishioka be quartz, instead of a ceramic, since the selection of these known equivalents would be considered within the level of ordinary skill in the art as evidenced by Johnston’s teaching.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fitzpatrick et al. (“Close-Spaced Thermionic Converters with Active Spacing Control and Heat-Pipe Isothermal Emitters”) (of record), DiMatteo et al. (US 6232546), and Nishioka et al. (US Pat. No. 4,880,975) (of record) in view of Tavkhelidze et al. (WO 99/13562) (of record).

Regarding claim 6, Fitzpatrick, DiMatteo, and Nishioka teach the invention of claim 1, but fail to teach wherein the first electrode comprises titanium. Tavkhelidze teaches wherein the first electrode is titanium and the second electrode is aluminum in order to prevent thermal expansion of the electrodes from causing the electrodes to touch (Page 16, lines 29-40). Therefore, it would have been obvious to one of ordinary

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skill in the art to modify the invention of Fitzpatrick, DiMatteo, and Nishioka to have the first electrode be titanium and the second electrode be aluminum in order to prevent thermal expansion of the electrodes from causing the electrodes to touch, as disclosed by Tavkhelidze.

Claims 7 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fitzpatrick et al. ("Close-Spaced Thermionic Converters with Active Spacing Control and Heat-Pipe Isothermal Emitters") (of record), DiMatteo et al. (US 6232546), and Nishioka et al. (US Pat. No. 4,880,975) (of record) in view of Edelson (US 5994638).

Regarding claims 7 and 24, Fitzpatrick, DiMatteo, and Nishioka teach the invention of claims 1 and 13, but fail to teach wherein the second electrode comprises silver. Edelson teaches wherein both the first and second electrodes are silver in order to provide low work function electrodes and have a high current density (Column 6, lines 16-20). Therefore, it would have been obvious to one of ordinary skill in the art to modify the invention of Fitzpatrick, DiMatteo, and Nishioka to have the electrodes be silver in order to provide low work function electrodes and have a high current density, as disclosed by Edelson.

Allowable Subject Matter

Claims 14-23 and 25-26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anne M. Hines whose telephone number is (571) 272-2285. The examiner can normally be reached on Monday through Friday from 8:00-4:30.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Anne M Hines
Patent Examiner
Art Unit 2879

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6/15/06

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PRIMARY EXAMINER